# Ecological Site Inventory Case Study: Integration with NRCS Soil Survey in Montana

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# Objectives

- Fundamentals of Montana’s rangeland ecological site system
- Integration of soil survey and ecological sciences programs
- Unique ways we are gathering and using data
- Recommendations

Native plant communities are strongly influenced by soil properties and climatic factors.

Photo by Eve Wills

Lack of consistent assignment of ecological sites to soils between individuals and between different areas of the state.

Low resolution of ecological sites to account for climatic variations and their influence on plant communities

# Fundamentals of the Montana Ecological Site System

1. Ecological Site Key
2. Relative Effective Annual Precipitation (REAP)
3. Temperature Moisture Regimes and Models
4. Land Resource Unit (LRU)

# Montana Rangeland Ecological Site Key

Incorporated relative effective annual precipitation (REAP) and soil temperature into our system

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Photo by Eve Wills

# Map Unit Polygons

# Temperature Moisture Model

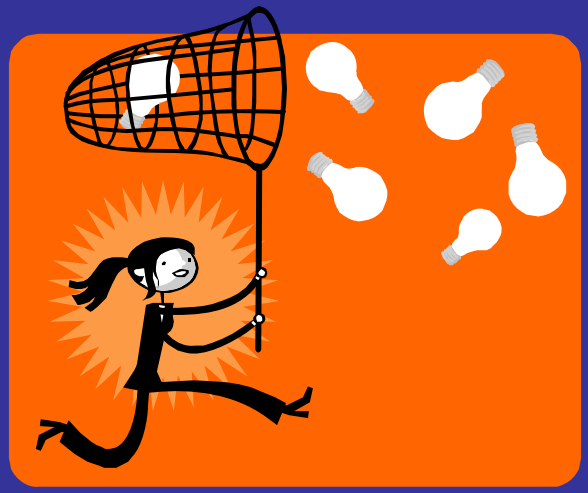
# Land Resource Unit

MLRA’s are further subdivided because of significant differences in climatic influences.

Moisture Temperature Regimes are tailored to each MLRA.

# Land Resource Units in MLRA 43B

# Unique ways we are gathering data



# Collection of Ecological Site Data by Montana Field Soil Scientists

# Soil Scientists during production calibration and vegetation ID training

# Ecological information field soil scientists collect at each soil description site (Tier II):

- Determine MLRA (Major Land Resource Area)
- Determine LRU (Land Resource Unit)
- Determine Ecological Site
- Ocular estimate total dry weight of site in pounds/acre
- Ocular estimate dry weight for each species
- Ocular estimate percent soil surface cover
- Ocular estimate shrub canopy cover
- Management observations

Soils Site Data entered into PEDON PC and uploaded to NASIS

# Ecological Site Data is entered directly into the Rangeland Database through a custom Montana data entry form

# Montana Soil Survey Ecological Data Entry Form

# The reasons it works

MT State Resource Conservationist

# Support from Above

Pat L. Shaver
West National Technology Support Center

Ron Nadwornick

MT State Resource Conservationist

Chuck Gordon

MT State Soil Scientist

MO Leader Region 4

# Old Fashion Stuff – Collaboration, Communication, and Ingenuity

Jay Skovlin

Party Leader and Pedon PC Plus Guru

Mike Hansen

Assistant State Soil Scientist

**Jon Siddoway**

**State Range Conservationist**

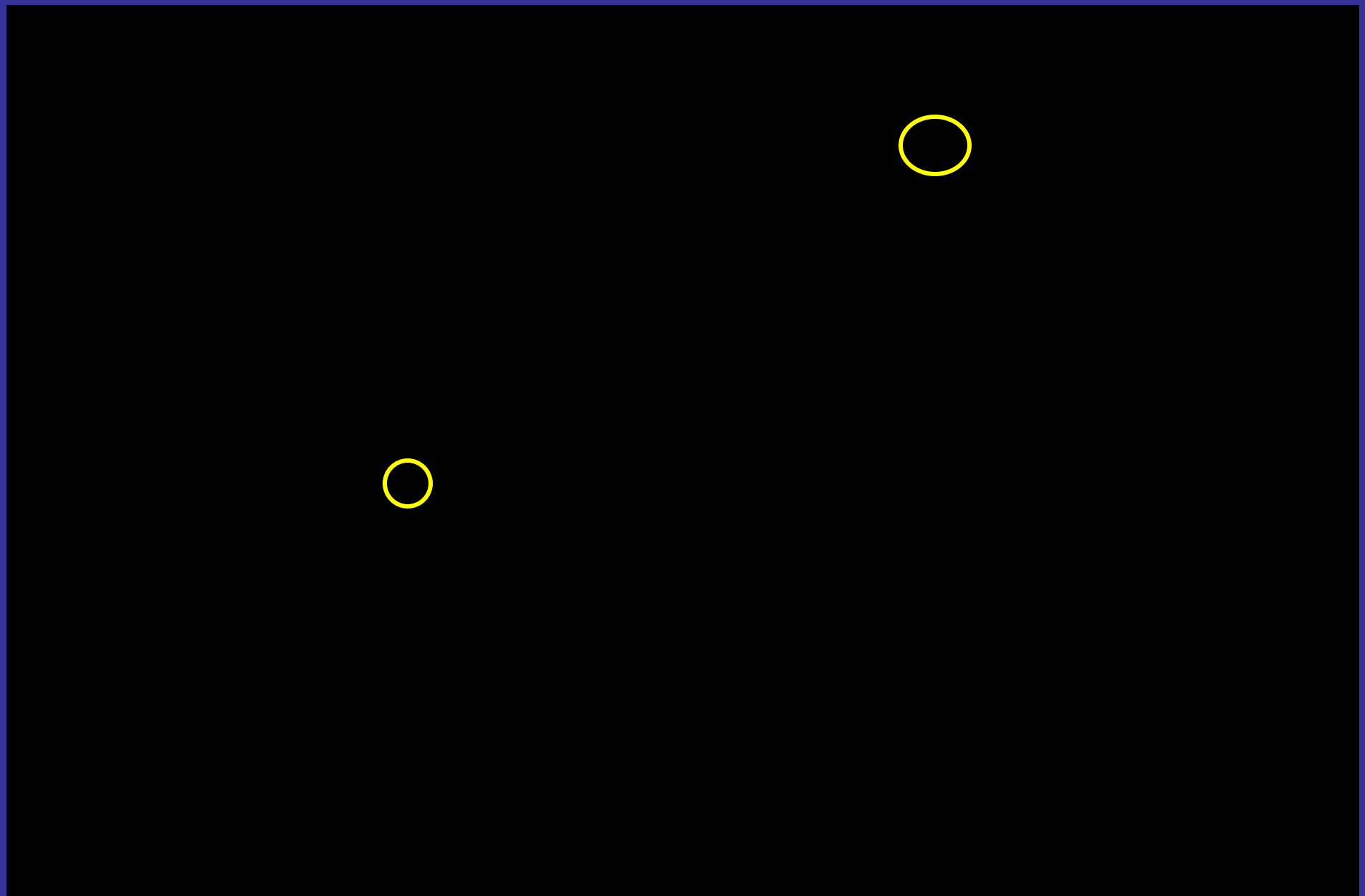
Additional Range Specialist brought on to support Montana Soil Survey Program

Tammy DeCock

Example of the utility of this system and how we use it to help us describe soils and correlate vegetation differences

# Color Infrared Display with Pedon Points in Soil Survey MT645

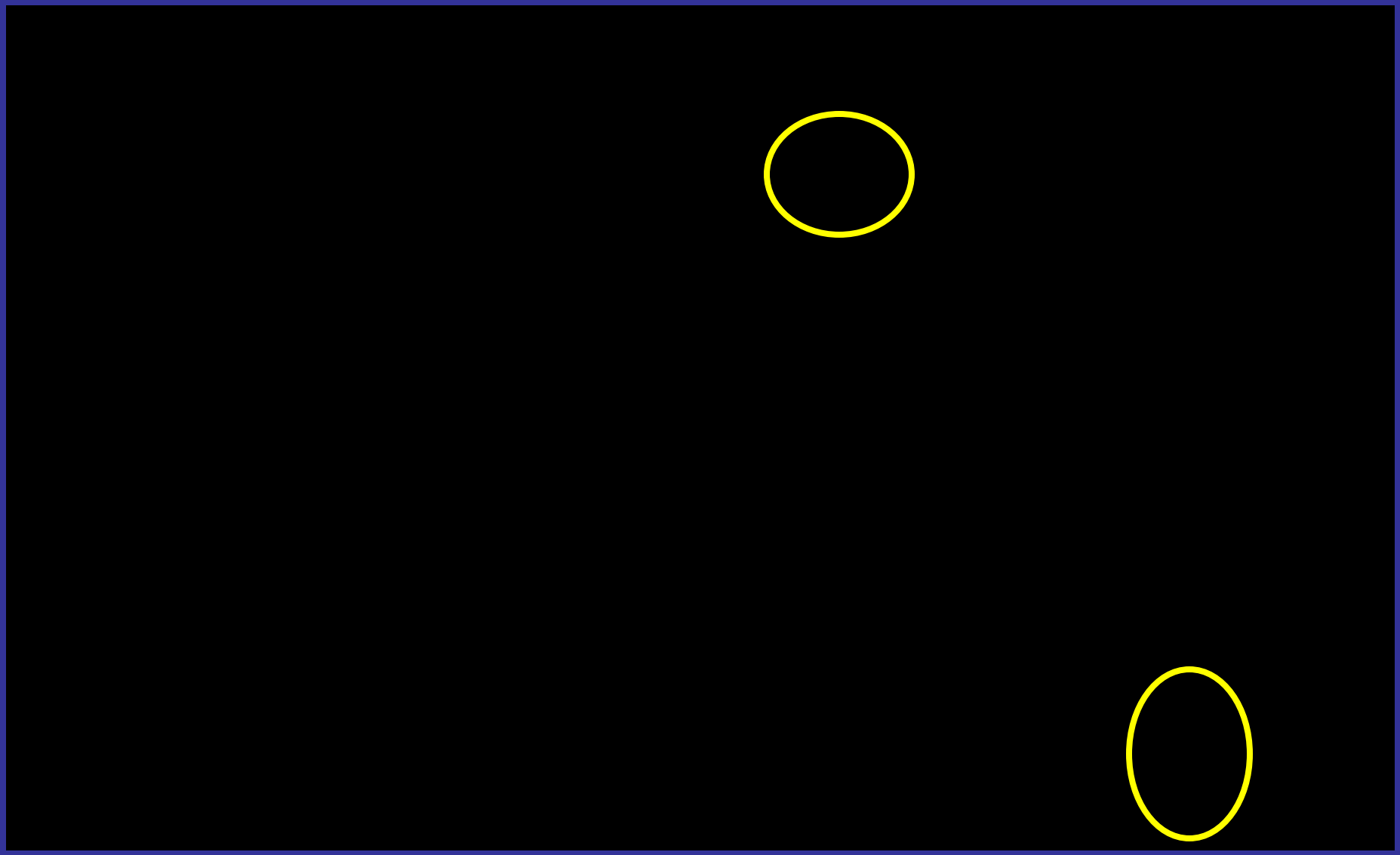
# Temperature Moisture Model for Soil Survey 645



# Mountain Big Sagebrush (*Artemisia tridentata ssp. vaseyana)* dominated site

Soil of the mountain Big Sagebrush *Artemisia tridentata ssp. vaseyana* dominated site

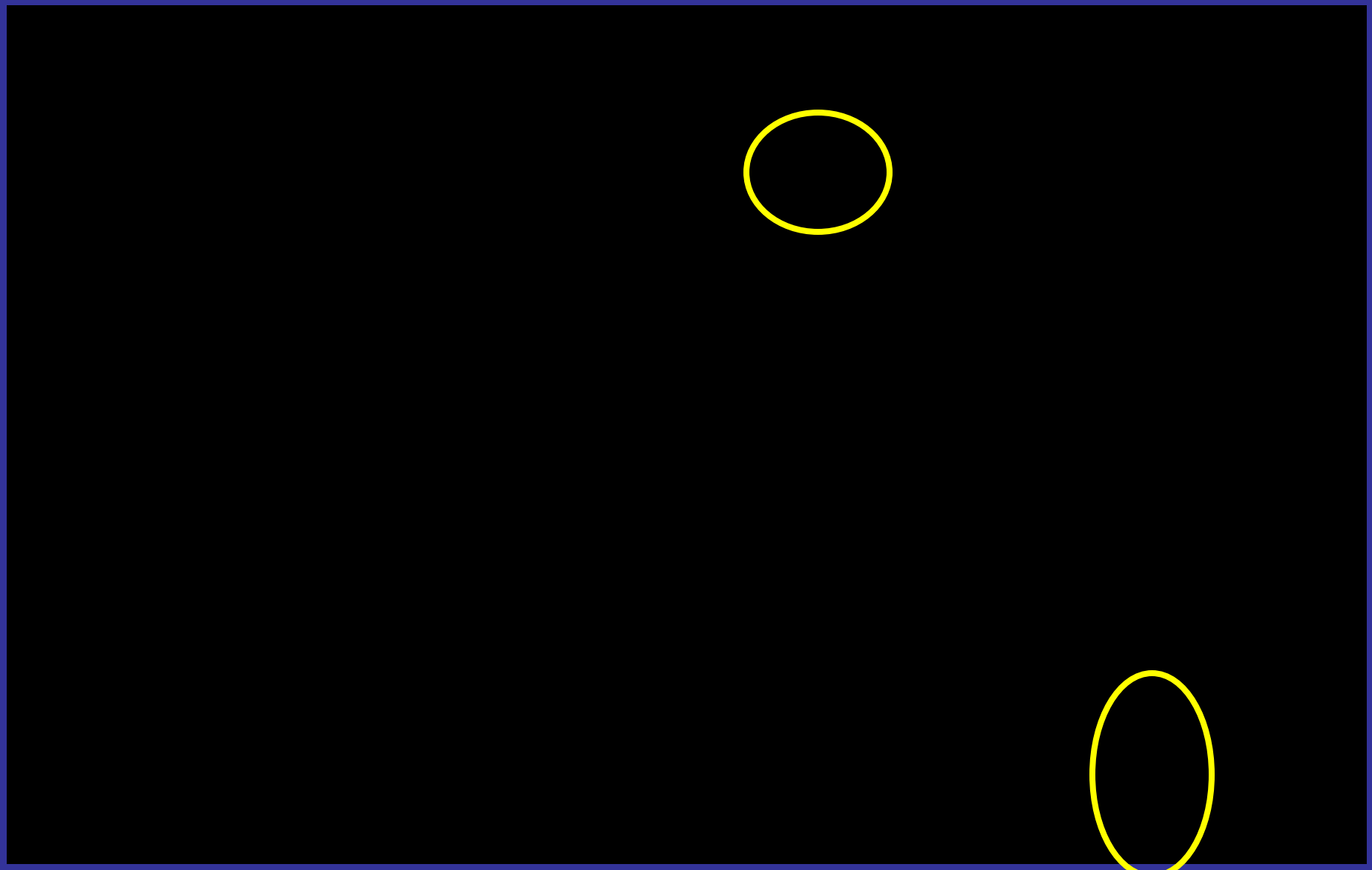
# USDA-NRCS Pedon Description



# Rough fescue (*Festuca campestris)* dominated site

# Soil of the rough fescue (*Festuca campestris)* dominated site

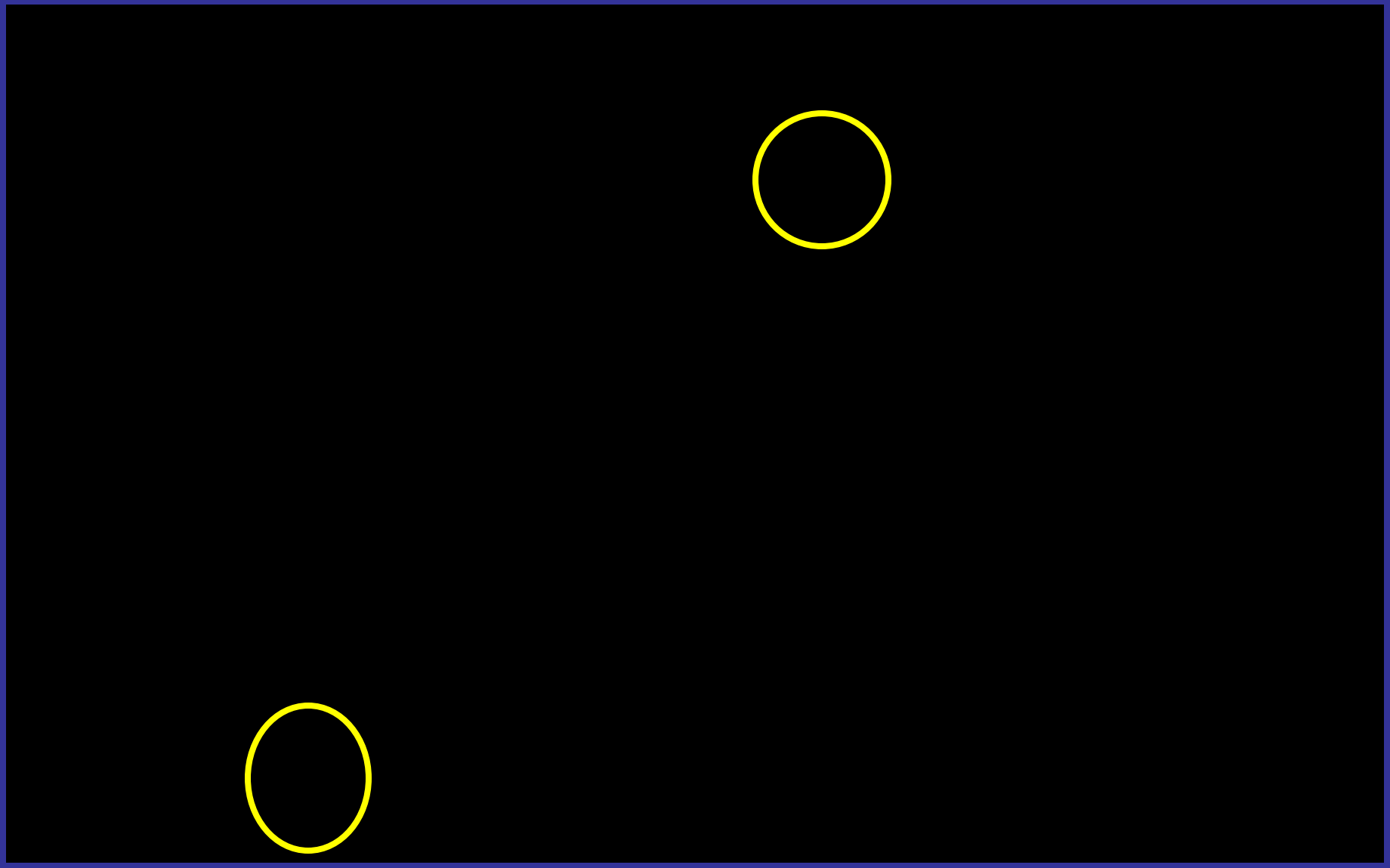
# USDA-NRCS Pedon Description



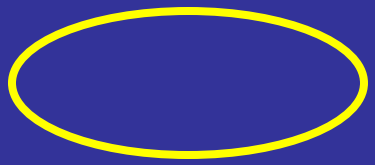
# Ponderosa Pine (*Pinus ponderosa)* Snowberry (*Symphoricarpos albus)* habitat type

# Soil of the Ponderosa Pine (*Pinus ponderosa)* Snowberry (*Symphoricarpos albus)* habitat type

# USDA-NRCS Pedon Description

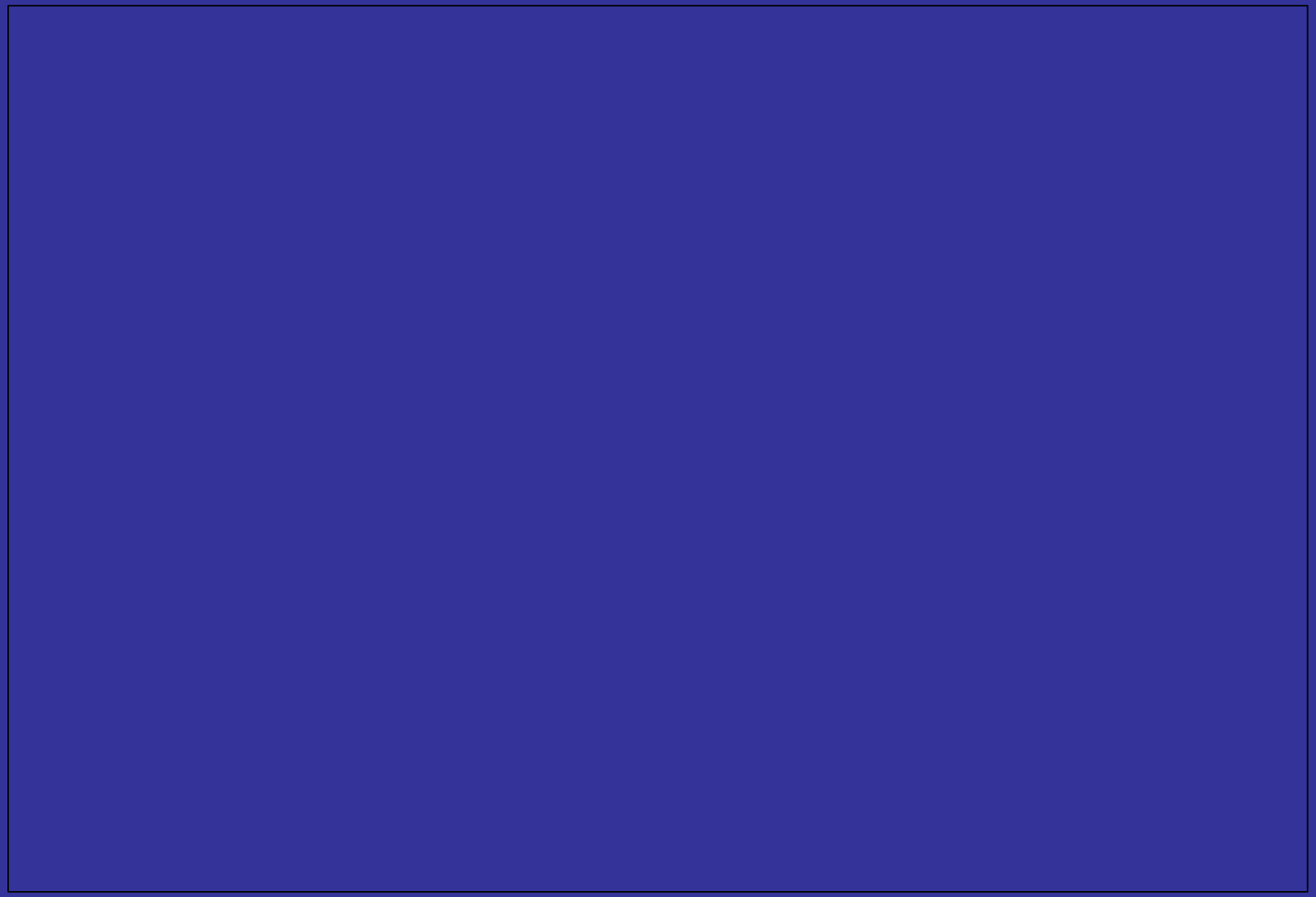


# USDA-NRCS Pedon PC Plus



# Rangeland Database – Data Entry Form with “Vegetation” Child Table Example

# Rangeland Database – Data Entry Form with “Surface Cover/Site Characteristics” Child Table Example



# Rangeland Database – Data Entry Form with “Site Notes” Child Table Example

Vegetation and soils databases are linked via Pedon site ID to facilitate analysis

but a more complete integration is desired

Montana will be prepared to incorporate soil change procedures into our understanding of ecological relationships.  Data on species composition and production will also be useful in MLRA Soil Survey Update.

# Summary

Brandon Bestelmeyer

USDA-ARS Jornada Experimental Range
and USDA-NRCS

# Elements of a successful approach to data gathering as part of soil survey and ESD development

1) One or more range cons working with soil scientists

2) Range cons that understand soils

3) A vegetation/soil surface sampling protocol that matches the pace of soil sampling

## Elements of a successful approach to data gathering as part of soil survey and ESD development

4) A coding system that relates vegetation measurements, soil measurements, and coordinates at points

5) Many points with varying levels of detail at a regional scale, rather than a few points with unnecessarily high precision

6) A database to house these data and their relationships

# Recommendations

- Soil and ecological science disciplines need to collaborate at all levels
- MLRA offices should have a vegetation person dedicated to Soil Survey
- Cross-train soil and range scientists so we know what questions to ask

# Recommendations

- Incorporate Pedon PC Plus protocol into all soil survey activities
- Vegetative and soil databases need to be integrated to facilitate analysis capabilities
- University soil science and ecology curriculums must include cross-training

# *Thank you for your time!*

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